



Issue Up Close: Managing Our Water Successfully

Historically, Washington residents have enjoyed an abundance of clean, inexpensive water, in a water-rich state. But water availability is no longer taken for granted. Washington increasingly lacks water where and when it is needed for communities and the environment.

Many factors contribute, including rapid population growth and economic expansion. In 1972 our state's population was 3.4 million. Today we are experiencing dramatic growth, with a population of over 6.2 million. The growth rate in Washington State is such that we can expect to add a city the size of Tacoma to our state every two to three years. By 2030, the population is expected to reach between eight to nine million.



Farmers throughout Washington depend upon water to nourish their crops. People, fish, agriculture, commerce and energy needs all compete for water in our state.

Population growth affects water in two ways. First, more people will consume more water unless we use it much more efficiently. Secondly, unless we use low-impact development, our expanding population replaces natural water-absorbing ground cover with impervious or hard surfaces. Rainfall on these paved surfaces runs off immediately without percolating into aquifers. By contrast, water stored in aquifers moves slowly through the naturally purifying soils to recharge

our streams during low summer flows.

Other factors have brought this issue to the forefront: global warming affects the Northwest with reoccurring drought seasons. Multiple droughts since 1971 resulted in dry streams, withered and abandoned crops, dead fish, record low rivers and declining groundwater levels. Between 2000 and 2005, Washington experienced two drought emergencies, provoking drought declarations by Governors Locke and Gregoire.

Our challenge is to share our water supply and to use it efficiently and carefully so there is enough for everyone.

As a state, our challenge is to share our water supply and to use it efficiently and carefully so there is enough for everyone; to support people, fish, agriculture, commerce and growing energy needs.

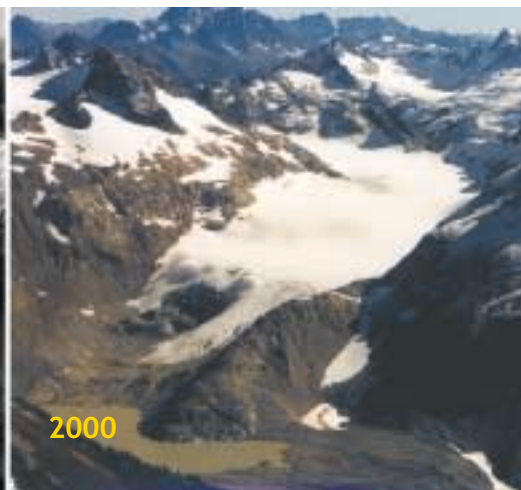
Our natural resources, our quality of life and economic stability face growing threats from rapid growth. How we collectively resolve competing needs is critical. Whether we know it or not, we are all - each and every one of us - water managers.



1928



1979



2000

Shrinking snowpacks are one factor that dramatically reduces water availability. Pictured here, the same view of the South Cascade Glacier over a period of eight decades.

Sharing Our Finite Resources: A Message from Ecology's Director

We all know that people around the world depend on water to quench their thirst, grow food, generate power, cool the machines of industry, beautify their surroundings, and renew their spirits. Water also provides essential habitat for fish and other animals. It is, in fact, so much more than this list of uses. It is the essential element of life – a miraculous liquid that distinguishes our blue planet from all others we have yet explored.

In Washington State, the availability of water determines our quality of life and the success of our farms, businesses and industries – and our competitive position in the global economy.

The problem is we will no longer have enough water to go around if we keep using it as inefficiently as we have in the past. This is especially true if Washington continues the extraordinary population and economic expansion that we have experienced since World War II.

Shrinking snow packs, increasing drought years, population growth and development all combine dramatically to reduce water availability. Our rivers and snow packs are weather dependent. We have inadequate stream flows. Education on this vital issue is a statewide priority.

For decades, Eastern Washington has been



Many visitors as well as residents enjoy the abundant streams and rivers in Washington State, including Ecology Director Jay Manning shown walking along the Deschutes River.

keenly aware of the limitations of our water. Western Washington – the “wet” side of our state – is becoming more aware as streams run dry in the summer and aquifer levels decline in some of our urban and suburban areas.

I believe we will turn the tables on this problem in our state, in spite of the rapid population expansion that is continuing to add the equivalent of another medium-size city every year or two.

Why am I optimistic? I have seen what Washingtonians are doing to share our precious water, even redistribute it, when the historic allocation no longer meets today's environmental value. For a century, the Walla Walla River ran dry in the summer, and the river's fabled salmon runs disappeared entirely. Now, because of the cooperative efforts of the Confederated Tribes

of the Umatilla Indian Reservation and agricultural groups on both sides of the Washington-Oregon border, the Walla Walla River is beginning to flow again in the summer and the salmon are returning for the first time in a century. While this thrilling restoration occurs, agriculture continues to flourish in the Walla Walla Valley.

That kind of cooperative effort is beginning to happen on a larger scale. In 2006, a diverse group of interests managed to put aside 35 years of stalemate in order to enact the Columbia River water management legislation. New Columbia River management rules will take advantage of the spring runoff in the Columbia to make water available for people and for fish in the dry summer months throughout the Columbia Basin.

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There are numerous other examples of communities across our state coming together to work on the water resource challenge. Some examples are outlined in this brochure.

I hope the information in these pages helps you make decisions about your role as manager of Washington's most essential and most valuable resource - our water.

— Jay Manning, Director
Washington State
Department of Ecology

Some Communities Facing Water Shortages NOW:

- Covington
- White Salmon
- Goldendale
- Colton
- Lacey
- Yakima
- Lynden
- North Bend
- Roslyn

Climate Change Affects Water Availability

Climate change poses an urgent challenge to the citizens of Washington and people the world over. Research by the University of Washington, Pacific Northwest National Laboratory and other regional scientists shows us that climate change will have serious consequences on the economy, health and the environment of Washington State.

Our region's natural and human-engineered systems are geared to longstanding climate patterns and rhythms. Abundant winter precipitation, primarily stored as snow in the mountains, anchors our economy and environment. A significant proportion of the water flowing in

our rivers in the summer time comes from snow melt in the mountains. Demand for water is at its highest in the late summer, and we rely – year in and year out – on the snow pack to supply this summer flow. This snow pack is the “fuel” for our hydroelectric system; it is essential for our agricultural productivity; it provides year-round water supply for people and habitat for salmon. Our customary release and use of this water, based on historic climate patterns, is a critical feature of our water system.

It is increasingly clear that changes are in motion. The effects of global warming are already evident in the form of higher tempera-



Dry Methow River bed, 2001 drought.

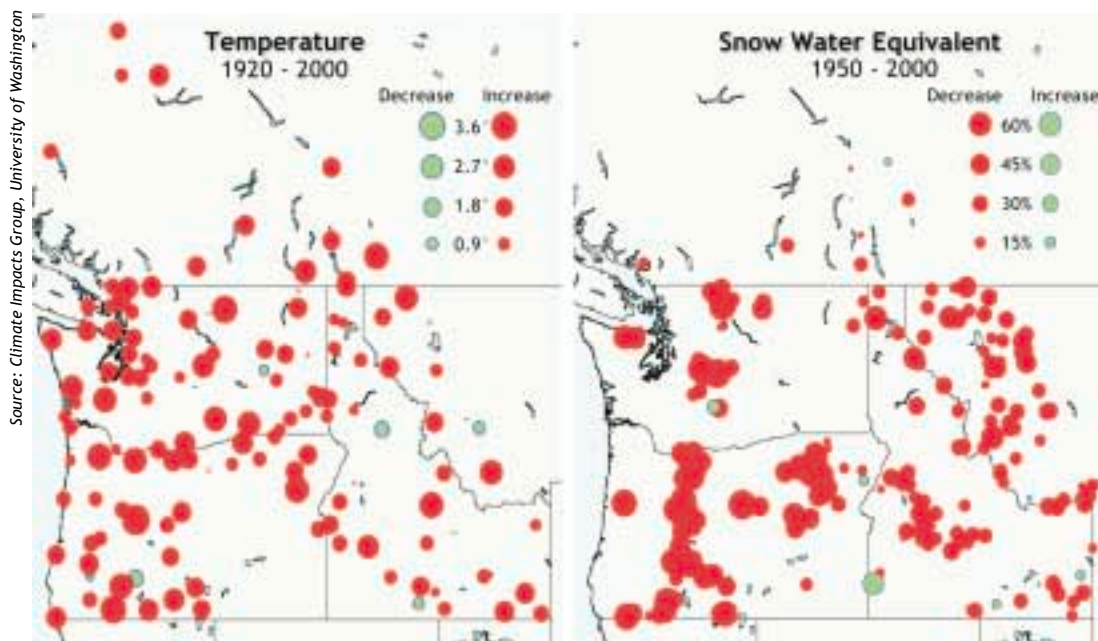
tures, reduced snow pack, insect infestation and increased fire danger.

Nearly all of the state's 700 glaciers are receding rapidly, and many have disappeared in the past few decades. Since 1983, students from Nichols

College in Dudley, Mass., have been studying glaciers in the North Cascades, nearly all of which drain into the Columbia River system. To the west, near Mount Stuart, the college recorded 15 glaciers in 1969. Now there are 12, four of them dwindling rapidly. Deprived of sufficient snowfall and melted by warming temperatures, the receding glaciers could one day mean less fresh water for river systems.

We can expect more extreme weather events and rising sea levels on our coastal shores. These impacts will grow significantly in coming years if we do not reduce greenhouse gas emissions and respond to challenges posed by climate disruption.

Temperature rise shifts snowmelt and spring snow packs



These maps show the increases in average annual temperatures and precipitation in our region since 1920. The size of the dot corresponds to the magnitude of the change. Region-wide warming combined with declining snow packs is evident in these graphics.

The concerns for the future: climate and population

Natural and human systems will be increasingly stressed by the accelerating rates of change caused by both climate change and by increases in regional population. Washington's vulnerability to climate change will be determined by the relationship among climate, natural systems, and human choices.

◆ Climate changes in snow pack are projected to accelerate. Global climate models indicate that Pacific Northwest temperatures are likely to rise at a rate of 0.2-1.0 degrees F. per decade during the 21st century, as compared to only 0.2 degrees F per decade during the past 30 years (possibly a fivefold increase).

More variability in our weather means less snow pack in the winter, more frequent rain and floods, and more frequent droughts.

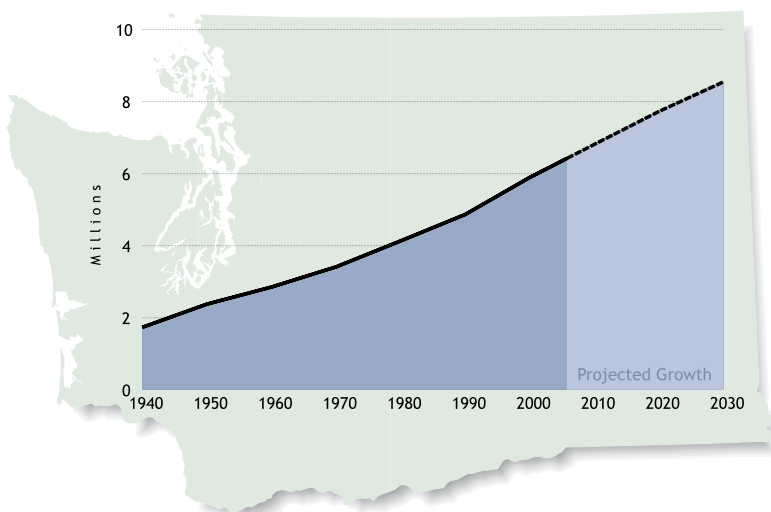
◆ Continued changes in snow pack and stream flow caused by these rising temperatures will have important consequences for water availability across the state. These challenges are likely to be most acute during the summer. Examples include water for

- fish returns
- hydropower
- successful grape and other fruit harvests.



Photo taken at Dungeness-Woodcock Bridge in August 2004 (top).
Drought affects flows in August 2005 (bottom).

Projected population growth for Washington state



Washington's population continues to grow.

◆ Regional climate records indicate multi-year droughts have occurred in the past. Prolonged drought would severely tax the coping ability of residents, businesses, and salmon.

◆ As our changing climate reduces our mountain snowpack, we will need to find ways to do nature's job of capturing water and holding it for use in the dry months.

◆ The projected increases in state population (to 8.5 million by 2030) will impose further stress on our natural and human systems.

Successes Around Our State

Columbia River breakthrough

The Columbia River basin is the second largest in North America, draining parts of seven states and most of British Columbia. It has an annual average flow of 7,785 cubic meters per second (cms), second only in the United States to the Missouri-Mississippi River. The Columbia River dam system has more than 250 large reservoirs and over 100 large hydroelectric projects, making it one of the most developed in the world.

For three decades, water policy on the Columbia River has been largely driven by litigation. The result has been gridlock, with little improvement for instream (fish and



The Columbia River system has more than 250 large reservoirs. Further study into storage systems is underway.

wildlife) or out-of-stream demand. The Columbia River Water Resource Management Program, resulting from legislation in 2006, will allow access to water resources while also helping to restore endan-

gered salmon and other species.

The 2006 Columbia River legislation is an historic opportunity for managing the water we have in a better way and exploring new options for storing water for the

future benefit of people and fish.

The bill also invests in water conservation projects and provides a formula for distributing water fairly – getting it to the right place at the right time.



The Columbia River Water Resource Management program provides water and restores habitat for endangered salmon.

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The legislation directs the Department of Ecology to focus its efforts on developing water supplies for the following needs:

- ◆ Alternatives to ground water for agricultural users in the Odessa sub-area aquifer;
- ◆ Sources of water supply for pending water right applications;
- ◆ A new supply of water for the holders of interruptible Columbia River water rights;
- ◆ New municipal, domestic, industrial and irrigation water needs.

The bill provides a formula for distributing new storage water in support of both in-stream and out-of-stream uses. Two-thirds of newly-stored water will be available to support new out-of-stream water uses, while one-third of the water will be reserved

Dams in the Columbia River basin



This map of dams connected to the Columbia River illustrates the far-reaching impact of the river in our state, in Canada and in surrounding states.

for stream flows and fish. Re-use of conserved water and water managed through voluntary regional agreements must be “water-budget neutral” during the months of July and August, when pressure on the resource is greatest.

Ecology is reaching out to communities, tribes, local governments and stakeholders asking how to best implement this legislation. We’re gathering information on what should be included in the Columbia River Water Resource Management Program.

In addition, a Columbia River water management implementation team is defining strategies for accomplishing the milestones outlined in the legislation.

This crucial program seeks to meet the needs of fish, farms, communities and healthy watersheds for the future.

Walla Walla watershed

A remarkable story is unfolding in the Walla Walla Watershed: a story of creative solutions, of environmental restoration, and of a community solving its own water management issues. Today, the Walla Walla River is home to fish that were absent for 100 summers. The agricultural and tourism industries are thriving.

Collaborative efforts can achieve outcomes that reduce or eliminate the need for regulations.

Some of the world's best wine is produced in the basin. Innovative agricultural techniques are being used to reduce environmental impacts.



Fish absent for 100 summers are now returning to Walla Walla rivers.

Photo courtesy the Walla Walla Watershed Basin Council.



The Walla Walla River from Tum-A-Lum Bridge looking south: vegetation is being allowed to grow to shade the water and help reduce the temperature.

The people – Native Americans, irrigators and environmentalists – are working collaboratively to restore, protect and advance their watershed and communities. They recognize that their futures are linked to one another. Instead of fighting, these three communities are protecting each other's interests while they work to rejuvenate the basin.

Collaborative efforts can achieve outcomes that reduce or eliminate the need for regulations. This community embraces the choice

to spend dollars on efficiency rather than on litigation costs. Tools to create water efficiencies include:

- ◆ Water Acquisitions
- ◆ Short and long-term leases
- ◆ Permanent purchase options
- ◆ Split Season – A portion of a water right is used for irrigation in the spring and the remainder is left instream in the late summer/fall
- ◆ Dry year option – An opportunity to lease a water right during a particularly dry year.

Watershed planning

In Washington's 62 watersheds, local people have the greatest stake in thoughtful, proactive water management. They have the knowledge of local resources and the future vision of those who work and live in the watershed. Ecology needs to hear from them to fully understand their vision for resolving diverse water supply needs. As Ecology helps to set stream flows across the state, we will build on the work accomplished by existing watershed planning units.

In 1971, under Governor Dan Evans, lawmakers made a far reaching and visionary decision about Washington water. They adopted the Water Resources Act of 1971 authorizing Ecology to establish instream flows.

These flows, which are set by regulation, are intended to ensure and maintain stream flow adequate to protect fish and wildlife, recreation, navigation, and other instream values. Between 1971 and 1985, the agency adopted 18 different flow rules across the state. From 1985 to 2001, Ecology

took a pause from setting new instream flows while state lawmakers and local, tribal, state and federal interests evaluated how future rules should work. In 1998, the Legislature adopted the Watershed Management Act, creating a collaborative approach for managing state water supplies. Since the law was enacted, local planning groups have completed and county governments have adopted new watershed plans for 20 different watersheds. Over half of those have begun implementing their recommendations.

Water as an economic driver in Washington state:

- **Value of well water:** The current estimated value of having a well for domestic use is \$27,000. The value to a residence of having access to city water supply is this minus the delivery charges.
- **Value of domestic water right:** A domestic water right, if it is a limiting factor in a developing area, can contribute \$40,000 to \$80,000 to a lot's value.
- **Value of irrigation water:** Water for agriculture east of the Cascades is valued at \$40 to \$120 per acre-foot per year. Washington's 1.8 million acres of irrigated agriculture (43% of farms) generated \$2.9 billion in agricultural products sold in 2002, the latest year for which data is available.
- **Economics of fish:** Fish that are dependent on Washington's freshwater have an annual economic value of \$1.26 billion.
- **Water as energy:** Washington's 93 in-service dams will generate \$3.3 billion in 2006.



Conservation Districts assist farmers and orchardists with the installation of drip irrigation systems to replace older, less efficient systems. Washington's irrigated agriculture generated \$2.9 billion in 2002.

We are currently supporting watershed planning and implementation in 37 basins around the state and developing instream flow rules in eight:

- ◆ Quilcene-Snow
- ◆ Dungeness-Elwha
- ◆ Grays-Elochoman
- ◆ Cowlitz
- ◆ Lewis
- ◆ Salmon-Washougal
- ◆ Walla Walla
- ◆ Samish

Ecology seeks local agreement and cooperation to develop and implement each



Returning salmon runs are supported by local efforts to restore instream flows.

instream-flow rule. We have been and will continue to work closely with local watershed

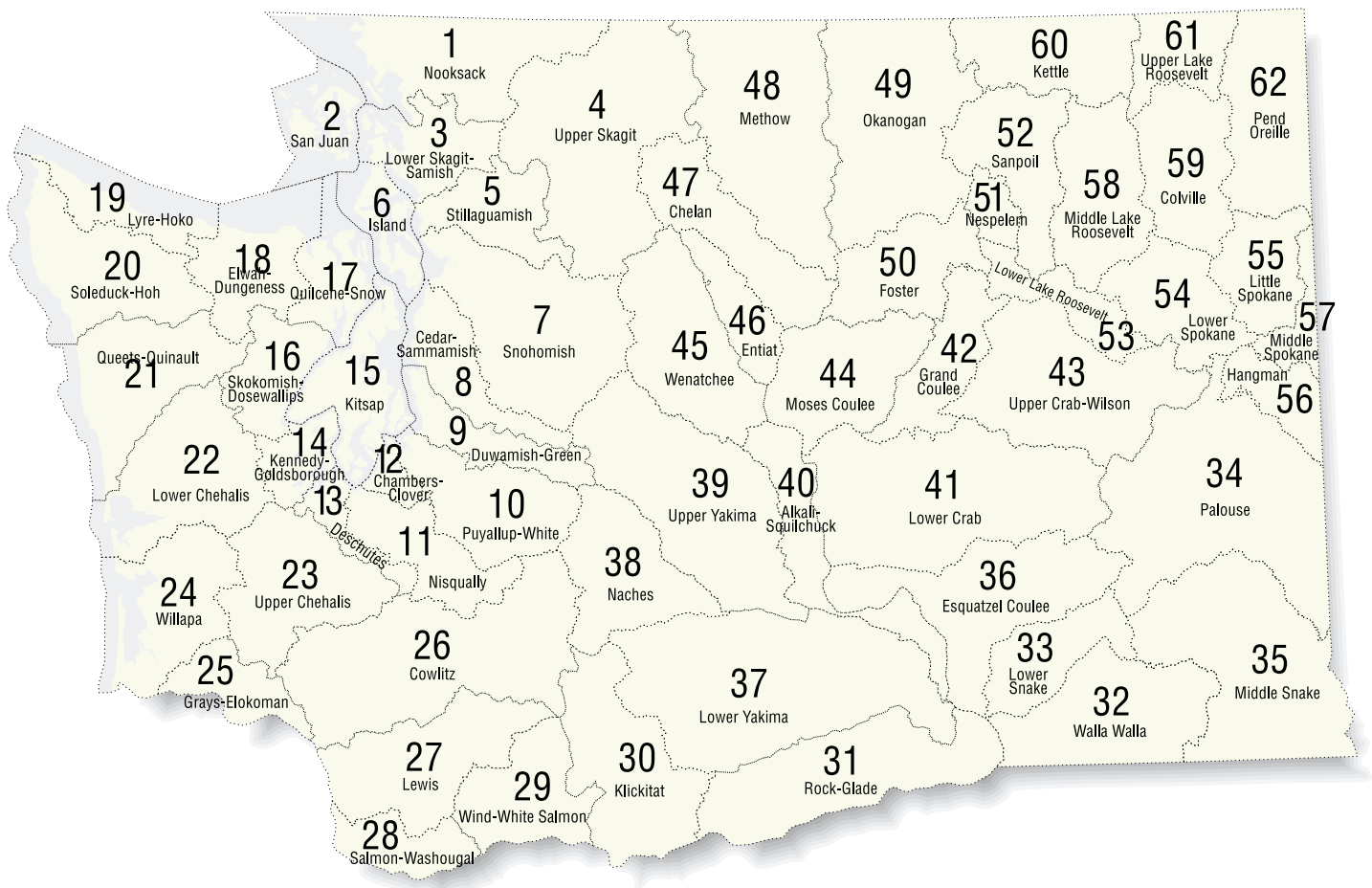
planning groups to adopt instream flow rules to help manage future water allocations.

Why is setting instream flow levels important?

Based upon stream gauging information, many streams around the state are often below critical flow levels; some streams have even reached historical lows. These types of low stream flows put fish and other resources at risk. In many watersheds, low stream flows have contributed to the decline of many threatened fish populations including:

- Chinook
- Coho and chum salmon
- Cutthroat, steelhead and Bull trout

Do you know which watershed you live in? Learning about your watershed is one way to be an effective water manager. Go to Ecology's website to learn more about what is happening in your watershed.



Communities and businesses conserve water

All across our state there are examples of conservation efforts that save valuable water, money and resources.

Here are just a few examples:

◆ A food processor in Eastern Washington conducted a water inventory of their facility identifying where, when and how water was used. By understanding

their water use better, it was easier to figure out how to save water in the least expensive ways. An inventory and understanding of how water is used is the first step in improved water efficiency. As a result of their efforts, each year they will save an estimated 25 percent of their total water use — or 33 million gallons annually.

◆ The City of Leavenworth was faced with per capita consumption of 1200 to



George Loos, Spokane Public Schools plumber, adjusts one of the new digital irrigation time clocks.

photos: WSDOT



The Department of Transportation saves water at rest stops: prior to the 2005 drought the common practice at the WSDOT was to try to keep much of the lawn green throughout the summer. During the 2005 drought, all outside irrigation practices were eliminated in order to conserve water. These photos demonstrate the conservation efforts. Bottom photo is before and the top photo is after the conservation efforts were put in place.

1500 gallons per day over three decades ago. Ultimately, the city upgraded its leaky water tower and sewage system. Then a pilot was launched to simulate a billing system to indicate what people would pay if they were charged fees in a two-tier system. This system sets a fee for use of a certain number of gallons in a time period. In excess of that amount, customers pay significantly more. This provides an incentive for keeping daily water use under a set level. Some local users saw a high rate for use if the bills were real. Meters were installed, water audits and real bills implemented. Real consumption dropped 45 percent.

◆ The cities of Olympia, Lacey and Tumwater, and Thurston County are developing the wave of the future: an aquifer recharge facility. The results of a recent feasibility assessment provided the basis for developing a new reclamation facility in the Hawks Prairie area of Thurston County. "Aquifer recharge areas" are places where water infiltrates into the ground and replenishes the water supply. Aquifers supply water to the rivers especially during the low flow times such as late summer. This project in the capital cities will allow rivers and streams to run healthy again in Thurston County, especially during the summer, when most needed.

◆ Seattle residents have embraced conservation techniques. According to Seattle Public Utilities, 400,000 more people are living in the metropolitan area since 2001, but water usage is back to what it was in the early 1970s. That conservation can be traced to public awareness campaigns and rebates to consumers for purchasing appliances and fixtures that use low amounts of energy and water.

All across our state there are examples of conservation efforts that save valuable water, money and resources.

◆ Spokane Public Schools gave maintenance staff tools and information to save 1 million gallons of water in a year by changing how they water outdoors.

◆ Washington State Department of Transportation projected it would reduce its water consumption by 28 percent from implementing landscape water conservation practices. They reduced consumption from 339 million gallons in 2004 to 245 million gallons in 2005, for a net savings of 94 million gallons.

Water-saving technical assistance

Ecology operates water-saving technical assistance programs to support businesses and industries who are interested in increasing their water-use efficiency.

Water reuse programs

Reclaimed water use is a fundamental element of our state's strategy to provide sustainable water supplies that will meet our future needs. For a background, see <http://www.ecy.wa.gov/biblio/0010062.html>. For case examples, including use of gray water for golf courses and other applications, see: <http://www.ecy.wa.gov/biblio/0510013.html>. Contact *Kathy Cupps* at 360-407-6452 for more information on water reuse.

Free engineering assistance for industrial water use reduction

Visit the Technical Resources for Engineering Efficiency (TREE) Web site to learn more about a free engineering and economic analysis to reduce water costs and minimize waste, at <http://www.ecy.wa.gov/programs/hwtr/tree>. You can also contact *Michelle Costenaro* at 425-649-7143 or *Lynn Coleman* at 360-407-6738 for further details.

Ag industry and business programs

Water metering informs users how much water they are using, which allows them to manage consumption. Money was appropriated by the Legislature to Ecology for cost-sharing the purchase and installation

of measuring devices. Ecology has entered into agreements with Conservation Districts in several areas to accept applications for cost-share contracts. To find out if your Conservation District participates, see: <http://directory.scc.wa.gov/>.



Yelm's water ordinance established a reclaimed water distribution facility as a condition of development approval. As a result of extensive public involvement, the Cochrane Memorial Park's fish pond was created.

What You Can Do

Volunteer in your community

As a water manager, there is much that each of us can do to share our water so there is enough for fish, farms and communities throughout the state:

- ◆ Find out what watershed you live in and what local conditions are in your “backyard.”
- ◆ Volunteer to monitor a local stream (http://www.ecy.wa.gov/programs/eap/flow/shu_main.html). The Nooksack Salmon Enhancement Association’s more than 600 volunteers participate each year in restoring approximately 14 miles of stream. You may want to join a watershed council or planning unit

For more information, visit <http://www.ecy.wa.gov/watershed/index.html> #Wpupdates.

- ◆ Apply and share tips on water conservation: <http://www.ecy.wa.gov/programs/wr/ws/wtrcnsv.html>.
- ◆ Participate in a local government and utilities partnership in water saving programs. Business and industry may replace inefficient toilets, single-pass cooling systems, water-cooled ice machines, laundry systems, medical equipment and many other systems. Most completed projects have financial paybacks of two years or less and often produce companion energy savings.



One way to conserve water is to beautify gardens with low -water use plants.

Things you can do

- ◆ Purchase a soaker hose and follow instructions to install at <http://www.savingwater.org/docs/SuccesswithSoakerHoses.pdf>.
- ◆ Install low flow showerheads or low flow toilets. Look for reimbursement or cost savings at <http://www.toiletology.com/index.shtml> and <http://www.house.org/tour/bath.cfm>.
- ◆ Observe plants for over- or under-watering. Water early in the morning or in the evening.
- ◆ If you live where rainfall is adequate, let your lawn go brown during the summer.
- ◆ Mow higher (1-2 inches), and leave the clippings (mulch-mowing or “grass-cycling”).
- ◆ As you replace plants, use natural or low impact landscape to lower water bills and reduce maintenance.
- ◆ Fill dishwashers and washing machines to full capacity before running.

For more Information

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Visit our pages on Ecology's web site: <http://www.ecy.wa.gov/programs/wr/wrhome.html>

If you need this publication in an alternate format, please call the Water Resources Program at (360) 407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call (877) 833-6341.



Stream Team volunteers Becky Daniels and Zoë Whorton plant trees next to Black Lake Ditch in the City of Olympia. Black Lake Ditch is home to juvenile Chinook, Coho, cut-throat trout, and steelhead.